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form to the Egyptian style of architecture, which frequently occurs in this place, but no others are thus ornamented. The number of sarcophagi found along the shores of the gulf is considerable, more especially at Keramus, where a double line seems to have formed the principal entrance to the city: they are very massive, but have all been opened. Some fluted columns, with Corinthian capitals and well-executed amphoræ and grape-vines, lead me to believe that a temple to Bacchus once existed there: the columns are in excellent preservation, but prostrate and overgrown with trees and shrubs. The city has passed through many hands, and several styles of architecture may be seen. The walls, which are plainly traced, and in some places perfect, are principally Cyclopean, repaired at different periods with Hellenic masonry, and guarded by square towers at unequal intervals: they are carried up to the foot of a range of hills joining the north end of the city. On a small hill at the extreme end of the range there has been a square fort, surrounded by a triple wall, which has probably been the citadel. At Giova, at the head of the gulf, I found some tombs cut in the rock, of which I also enclose a drawing and ground plan.

[Mr. Brock's letter was accompanied by two large charts of the island and gulf of Kos, on the scale of 1½ inch to a mile, showing the sites of the ancient towns, the heights of all the mountains, &c., together with various plans of ruins and several coloured drawings of headlands.]

IV.—*Note on a new Map of Kamchatka.* Extract from a Letter from Professor Adolph Erman.

Berlin, 26th February, 1839.

I have the honour to present to the Geographical Society my map of Kamchatka, the publication of which has been delayed by the care bestowed in superintending its engraving. With respect to the origin of this map, and the circumstances which might create some interest for it, I must refer to the first volume of the scientific part of the narrative of my journey, at pp. 209, 289, 346, and 387, where I have collected together my observations for latitude and longitude for about twenty points of the peninsula, and the barometric measurements of its mountains and elevated table-lands. At p. 346 I have compared the dimensions of the country according to all existing maps with those assigned to it by my own observations. They are at times reduced to two-fifths of the extent falsely assigned to them; and the result was, that this province of the Russian empire might be well considered among the *terræ incognitæ*. I might add, in support of this remark, that the latest Russian maps had, so to speak, doubled the existence of a whole series of localities, for we saw on them the names of many villages in Kamchatka, situated between the port of St. Peter and Paul, and the sources of the river Kamchatka, noted a second time along the direct line between the said port and the town of Bolcheresk. The truth is, that all these villages twice mentioned really exist only once, and that they were not aware at St. Petersburg that steep mountains prevented travellers from passing direct from St. Peter and Paul to Bolcheresk, but, on the contrary, obliged them to go first towards the N., by the same road which leads to the sources of the Kamchatka, and not to turn to the south-west till they had reached a large ravine which opens in a transverse direction through the mass of mountains which bound the course of the river Avatcha.

I have thought it right to dwell upon these corrections in the delineation of the form of the country and its conformation, because they alone can offer a solid basis to the comparative combinations of geology, and authorise our theories upon the volcanic character of the peninsula, as well as upon the origin of its mountains, its lakes, its eruptions of thermal waters and vapours. I shall soon publish a circumstantial account of my visit to Kamchatka, which will supply all that must be deficient in a map on the points I have alluded to; and I now content myself with some preliminary observations upon the general character of the geological phenomena of this country, which, from its position upon the natural limits of the old continent, seems to deserve particular attention.

Though the volcanoes lying along the eastern coast of Kamchatka are upon two great regular circles or geodosic lines, we find mountains of two kinds mixed, and almost in contact, in each of the two series, the characters of which are quite distinct, and indicate an essentially different origin. I shall endeavour to illustrate this fact by a single example, in directing your attention to the two mountains called Shiveluch, lat. 56° 40′, and the Pic de Kliuchevsk, lat. 56° 20′: the latter presents a large base swelling in an elliptic curve, and crowned by four cones, one of which is as high as Mont Blanc. I have seen this in picturesque and sublime activity, and approached the burning lava, which poured forth a continuous stream, till I reached the height of 8000 feet above the sea. But in this ascent, and during several days that I was exploring the valley and deep ravines that furrow the circumference of the cones and the base of this immense volcano, I sought in vain to find some very compact rocks (if I may say so), formed by a single jet, and that one have might likened to the structure of a granitic mountain or any other primitive rock, and consequently looked upon as belonging to a sort of crystallized skeleton, into which the streams and fragments of lava had only passed as by a previously-confined vent. On the contrary, though the sides of this Pic present in many places walls 100 feet high, these masses are always blistered and impressed with the character of ordinary streams of lava, still hot, and which have only just had time to set. The one and the other consist of an augitic, amorphous, and strongly-blistered mass, with large crystals of Labrador felspar.

Compare with this volcanic group the mountain Shiveluch, which is only a few miles from it on the N., and which, in spite of a considerable chemical conformity between its masses and the lavas of the Pic de Kliuchevsk, differs altogether in its outline and in the texture of the component rocks. The sketch I have added to my map will at once show it has not the least resemblance to an inflated ball, or to a cone of piled fragments. Shiveluch, on the contrary, presents the aspect of a principal crater and several subordinate ones, in the form of tables or plains, each of which is comprised between two parallel* vertical sides, terminated at the top by an inclined plane. These upper surfaces terminate at the culminating point of the mountain, about 10,000 feet above the sea, where all these immense prisms unite and are lost. I allow that at first sight the form of this outline made me look upon Shiveluch as a mass forced from beneath the surface at a single eruption, in a state very near consolidation, and through apertures that previous pressure had opened in the shape of a star; but what still further strengthened this hypothesis is, that the parts of this mountain consist of a perfectly crystalline rock, composed of *albite* and *amphibole,* which, though evidently pyroxene, resemble flowing lava as little as the granitic rocks of the Alps, or any others that we call primitive. The result of several similar examinations was to convince me that the volcanoes on the E. of Kamchatka owe their origin to two entirely distinct causes. Some of these mountains, such as Shiveluch, and those like it, appear to me formed at a period when the hardened crust that covered the melted nucleus of our planet had still so little thickness that it cracked by the molecular expansion of those beds that were in process of crystallization beneath. Of this number must have been (both in Kamchatka and in America, where it forms the summits of several of the Cordilleras) the rocks composed of albite and amphibole, which at that time forced itself in masses through the crevices it opened for itself—as we see ice, when formed beneath a solid body, split it, inject itself, and pass through it in the form of prisms, by the repulsive tendency of its molecules at the moment of freezing alone. Such a formation, if not unheard of, is become very rare now—probably because, through the constant escape of central heat in the earth, the consolidated bed has already acquired such thickness, that the masses setting beneath cannot penetrate it entirely by the power of their molecular expansion. All that we now see of volcanic action, either in the volcanoes of Kamchatka or those of other countries, is very evidently owing to the co-operation of steam, the elasticity of which corresponds to the temperature of the fusion of lavas, or, at 800° of Réaumur, raises and expels by former passages streams of mineral bodies, whose density is much lessened, and consequently their passage facilitated by innumerable bubbles of gas and vapours with which they are impregnated. As to the body of mountains which occupy the longitudinal diameter of the peninsula, I found them bristled with a number of volcanic lavas which rise up and appear set in rocks more or less evidently pyrogenic. I have drawn upon the margin of my map one of the streams of augitic lava that I observed in this central chain of Kamchatka (Volcan des Baidares). The conical heaps of scoriæ and volcanic cinders, as well as the furrows and "moraines" which the lava-torrents have excavated before them, still look so fresh, that they continually tempt us to consider them the result of a recent eruption; and yet the natives declare that no change in the mountains has occurred from time immemorial. The western side of Kamchatka is composed of neptunian, secondary, and tertiary rocks. I observed the chalk-formation and lignites very rich in yellow amber, covered with ferruginous sandstone. This disposition has doubly interested me, since I compared it with the famous amber-formation on the shores of the Baltic, near Königsberg. It is really curious to find at so great a distance (as between the Baltic and the sea of Okotsk) contemporary beds whose mineralogical characters so minutely resemble each other.

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* I must observe that the foot of these vertical sides is surrounded and concealed to a considerable height by fragments which atmospheric agency has detached and crumbled from their own mass. The same agents cause avalanches of stone, which we heard fall with the noise of thunder continually, during several days we passed on the Shiveluch and the plains beneath.

I have collected a good number of fossil shells from these two formations, and propose shortly giving you the result of my comparison of the two.

ADOLPH ERMAN.